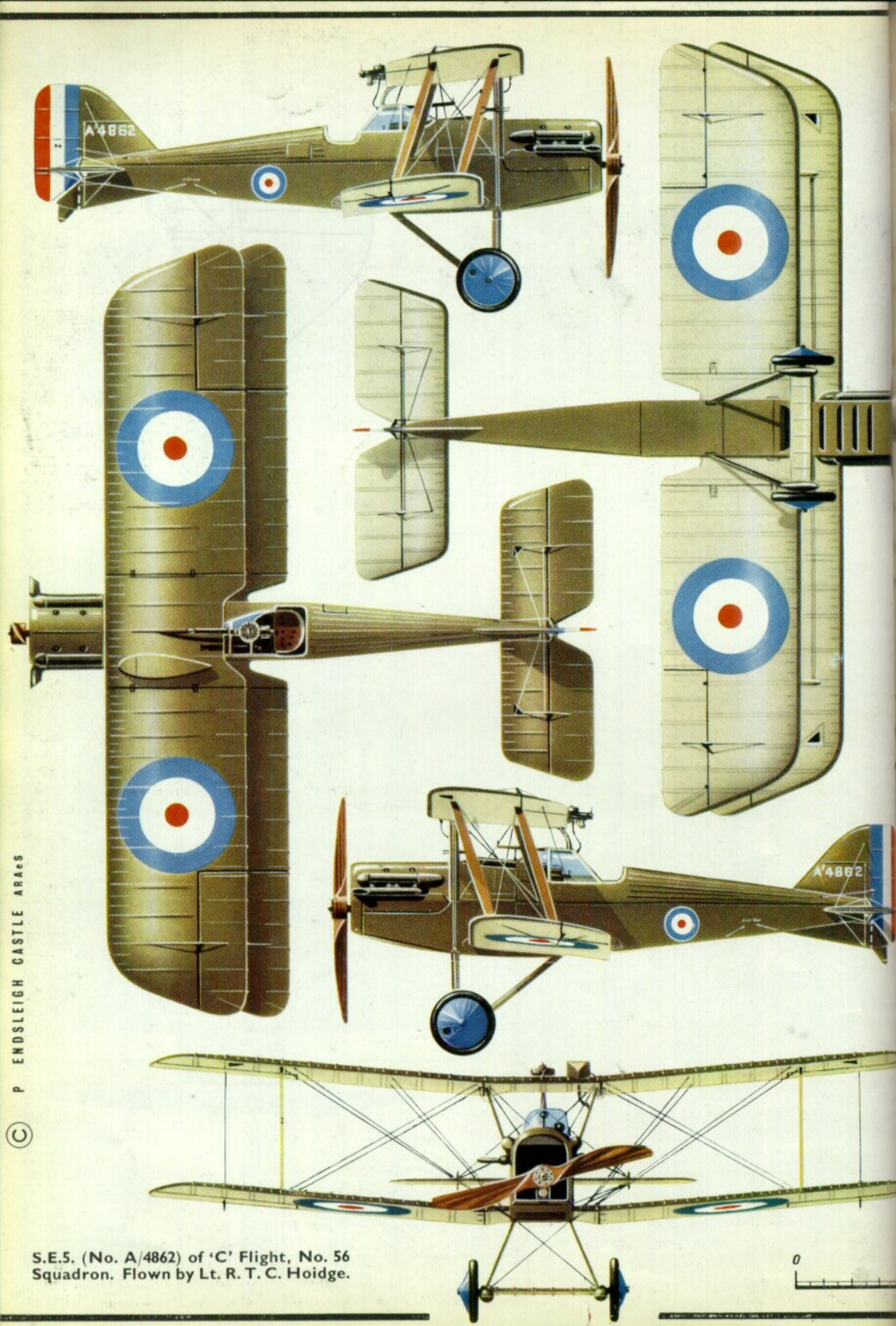
PROFILE
PUBLICATIONS

The S.E.5

NUMBER 103
TWO SHILLINGS



S.E.5. (No. A/4862) of 'C' Flight, No. 56 Squadron. Flown by Lt. R. T. C. Hoidge.

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The S.E.5

by J. M. Bruce

The first S.E.5, A4561, *photographed at Farnborough on 23rd November 1916. The small transparent panels in the sides of the top decking immediately behind the main fuel tank can be seen. In the cockpit is Major Frank W. Goodden.*
(Photo: Crown copyright)

During the ten years preceding the outbreak of the first world war the Barcelona factory of the Hispano-Suiza company founded by the great Swiss engineer Marc Birkigt turned out substantial numbers of high-quality motor cars, buses and lorries. A branch factory was opened in Paris but closed down before the war began.

About a month after the outbreak of hostilities Birkigt started work on the design of an aero-engine. The first prototype was completed by February 1915 and its bench runs gave an early indication of the new engine's potential. Weighing only 330 lb., the Hispano-Suiza delivered 140 h.p. at 1,400 r.p.m. It was a V-8 engine incorporating several new and advanced ideas: aluminium monobloc castings were used for the cylinder banks, steel liners that were threaded over their full length being screwed into them. The substantial cylinder blocks helped greatly to stiffen the light, weak crankcase; the engine's somewhat complex valve gear was wholly enclosed and was lubricated with oil from the crankcase.

The French government had been interested in the engine from the design stage and sent a mission of experts to Spain to examine the prototype. An example of the Hispano-Suiza was delivered to France in July 1915 and was subjected to an official test at Bois-Colombes. This required a non-stop run of ten hours, but the engine performed so satisfactorily that the run was extended to fifteen hours. Running at 1,550 r.p.m., it delivered over 150 h.p. A French order for 50 was placed, and negotiations for large-scale licence production of the engine in France were started.

The original engine that was delivered to France was inspected in Paris by Lt. Col. H. R. M. Brooke-Popham. He was so impressed by the Hispano-Suiza that he recommended the ordering of a quantity; and in August 1915 the first British order, for 50 engines, was placed.

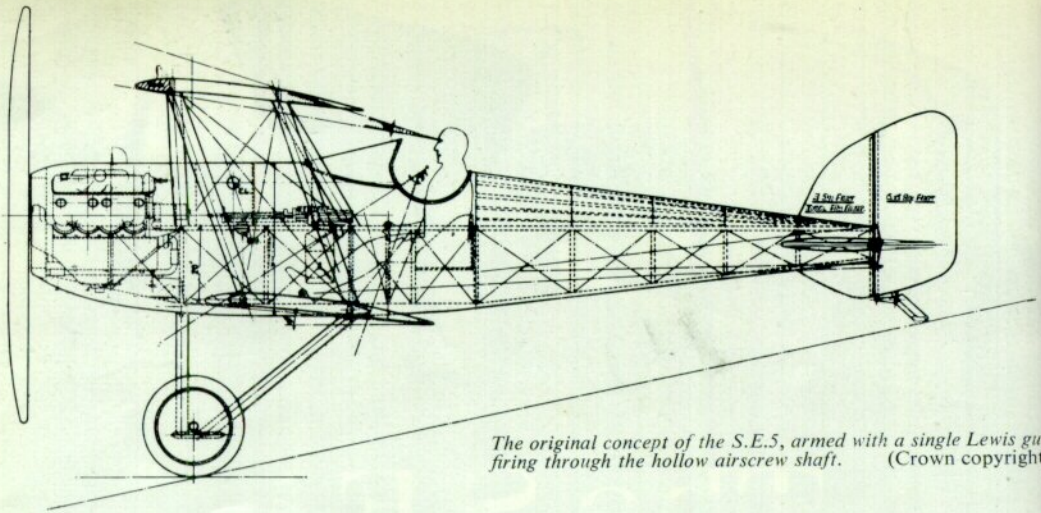
Deliveries against this order did not begin until August 1916, but at least one specimen engine was transferred or lent to the R.F.C. early in 1916. In March of that year it was installed in a B.E.2c at St. Omer and its tests began on the 13th of that month. In a letter written on that day Lt. Col. Brooke-Popham wrote:

> "It is a beautiful engine. I have seen one taken down, and the more one sees of it the better one thinks it is. The only disadvantage is, to grind in a valve one has to take off all four cylinders but the makers declare that the valves hardly ever require grinding in."

In the summer of 1916 the design staff of the Royal Aircraft Factory drew up preliminary layouts for two single-seat fighters embodying the Hispano-Suiza engine. The first of these was a neat tractor biplane, designated S.E.5; the second, the F.E.10, was a freakish development of the B.E.9 in which the pilot and his single Lewis gun were to be accommodated in a nacelle mounted in front of the tractor airscrew.

Fortunately the F.E.10 design was not developed, efforts being concentrated on the more conventional S.E.5. As originally conceived, the S.E.5 was to be armed with a single Lewis gun mounted on the centre line and firing, between the cylinder banks, through the hollow airscrew shaft. A geared drive to the airscrew raised the airscrew shaft to the level of the axis of the gun barrel. It is uncertain whether this installation was designed in anticipation of the geared 200-h.p. Hispano-Suiza or was a R.A.F. modification of the 150-h.p. engine. What is beyond doubt is that it was a remarkably early example of the armament installation that was to be realised in the later Austin A.F.B.1 and Vickers F.B.16D and, with a shell-firing *canon*, in the Spad XII.

The single-bay wings had a span of 28 ft. and were 5 ft. in chord; dihedral was to be 3 deg. 30 min., and there were upper and lower centre sections, 4 ft. in



The original concept of the S.E.5, armed with a single Lewis gun firing through the hollow airscrew shaft. (Crown copyright)

span; the leading portions of the lower centre section's stub wings were cut back almost to the front spar to increase the pilot's forward and downward field of view.

Development of the design was undertaken by H. P. Folland and J. Kenworthy and construction of three prototypes, *A4561-A4563*, was put in hand. Various modifications were made to the original design, the most noteworthy of which was the replacement of the rather small fin and rudder by surfaces of the shape designed for the abandoned F.E.10.

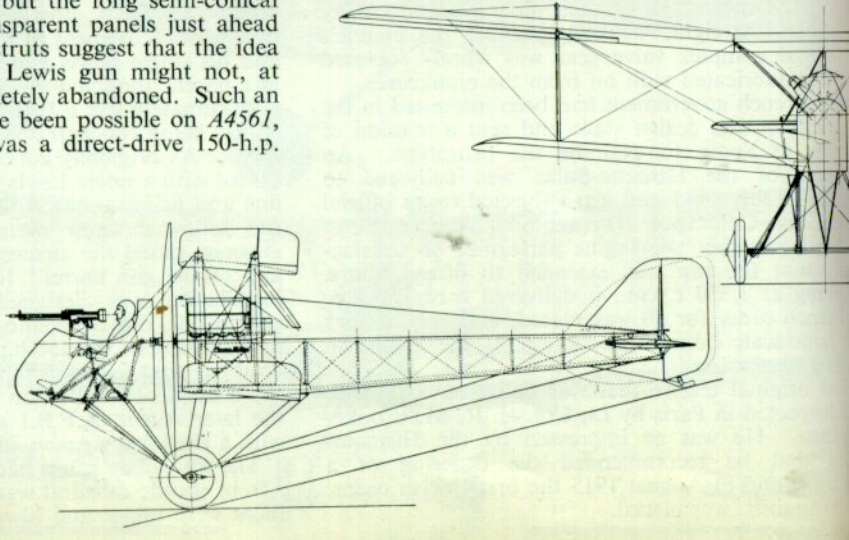
At noon on 20th November 1916 *A4561* was submitted for final inspection. An interesting light is cast on the halcyon simplicity of aeronautical engineering at that time by the fact that the "approved" note in respect of this first prototype of a completely new fighting aircraft was issued at 9-30 p.m. on the same day. After a pre-flight check on the following day, *A4561* took off on its first flight at 10 a.m. on 22nd November.

In the light of later events it is of some historical interest to note that on 23rd November *A4561* was flown by Captain Albert Ball, who made a ten-minute flight in the aircraft.

As originally built *A4561* had its gravity tank built into the leading-edge portion of the port upper wing. No armament was fitted, but the long semi-conical windscreen and small transparent panels just ahead of the rear centre-section struts suggest that the idea of fitting a single central Lewis gun might not, at that time, have been completely abandoned. Such an installation would not have been possible on *A4561*, however, for the engine was a direct-drive 150-h.p. Hispano-Suiza (No. 5213/W.D. 10100). The provisio of a Vickers gun was intended, and may even have bee made, at quite an early date, for on 17th Decembe 1916 Captain W. D. S. Sanday reported to GH that he had inspected the S.E.5 on the previous da and in his opinion the windscreen then envisage would not have allowed the pilot to clear his Vicker gun if it jammed.

A4561 was modified in several respects, but whethe before or after Sanday's inspection is uncertain. Vickers gun was installed in the fuselage to port centre, the windscreen was fitted with transparent sid extensions, modified exhaust manifolds with rea outlets were installed, and an external gravity tan was mounted on top of the centre section, which wa a new component with an enlarged cut-out in the trail ing edge. The centre section (component No. 14605 and port upper mainplane (No. 14611) originall fitted to *A4561* had been embodied in the thir prototype *A4563* by 12th January 1917.

The second prototype, *A4562*, was completed on week later than the first, being submitted for fina inspection on 27th November 1916. It is not possibl to be certain about the precise configuration of th aircraft at that time. It had the Hispano-Suiza engin No. 5193/W.D.10104, and surviving Royal Aircra



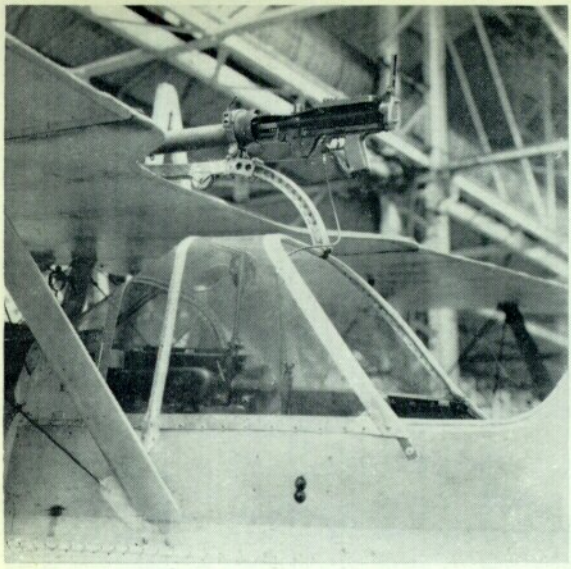
The F.E.10 project, also designed to have the Hispano-Suiza engine, from which the S.E.5, as built, derived its fin and rudder. (Crown copyright)

Above and Below: *This aircraft was long believed to be the first prototype, but it has recently been established that these photographs were made at Farnborough on 15th January, 1917. This indicates clearly that this S.E.5 was in fact the third prototype* A4563 *in its original form without armament. It had the same type of windscreen as* A4561 *and the same transparent panels in the sides of the top decking ahead of the cockpit. The patched fabric on the inboard leading-edge portion of the port upper wing shows plainly where the original gravity tank was removed.*

Factory records state that, on 27th November, it had the same airscrew (No. 14588/T.28041) that had been fitted to *A4561* a week previously. Unless some error of transcription occurred in those hand-written records, this strongly suggests that *A4562* originally had a 150-h.p. Hispano-Suiza driving a right-hand airscrew. The second S.E.5 made its first flight on 4th December 1916, but was damaged two or three days later. No armament was fitted at this time.

By 21st December 1916 *A4562* had been fitted with a Vickers gun and Constantinesco C.C. synchronizing mechanism, a Lewis gun on a Foster mounting, a new windscreen, and Aldis and ring-and-bead sights. Its main petrol tank had been modified, presumably to accommodate the Vickers gun, and a new gravity tank had been fitted.

These modifications put the aircraft on an operational footing, and on Christmas Eve it left Farnborough for France, piloted by Major F. W. Goodden. It was flown at St. Omer by Goodden, Lt. R. M. Hill



The large windscreen and cockpit details of a production S.E.5, showing the Lewis gun at the extreme positions permitted by the Foster mounting. (Photos: Crown copyright)

and Lt. F. H. B. Selous. Hill, (later Air Chief Marshal Sir Roderic Hill) was then a Nieuport pilot of No. 60 Squadron, R.F.C., Selous a Spad pilot of No. 19 Squadron. This suggests that one of the objects of the evaluation of the S.E.5 was to make a comparison between it and the French single-seaters.

Hill's report provides a concise summary of the trials at St. Omer:

> "The S.E.5 has in my opinion certain advantages over the Nieuport and Spad. Its speed is good; it involves little strain on the pilot; it climbs as slowly as a Nieuport and slower than a Spad; it is stronger than a Spad; its gun mountings are superior. Its disadvantage with respect to the Nieuport is that it cannot be manoeuvred with quite the same rapidity although at high altitudes manoeuvres should be possible with a much smaller loss of height."

Selous reported in similar terms, but commented that the pilot's view on the S.E.5 was "much better than Spad, especially forwards and downwards".

A few refinements were added to *A4562* while at St. Omer. Racks for spare Lewis gun drums were made and fitted; the Bowden cable firing mechanism was modified; a new cocking handle was fitted to the Vickers gun; and the tailplane-actuating wheel was modified. The S.E.5 returned to Farnborough on 4th January 1917, flown by Selous.

Goodden next flew the aircraft briefly on 26th January 1917. On the 28th, a frosty Sunday, he took off in *A4562* at 11-10 a.m. Eight minutes later, when he was approaching the Royal Aircraft Factory from the Cove direction, the aircraft broke up in the air and Goodden lost his life in the crash. Eye-witnesses stated that the interplane struts on one side had come out. As the wheel driving the Constantinesco gear could not be found among the wreckage, the theory was advanced that it had flown out and broken one of the interplane struts, thereby causing the wing cellule to collapse. An alternative theory was that the airscrew had disintegrated; indeed it seems that this was accepted as the cause of the crash by a committee of enquiry set up by the Royal Aircraft Factory.

This theory was not accepted by the late Dr. A. P. Thurston, who was at that time responsible in the Aeronautical Inspection Directorate for the design safety of aircraft intended for the R.F.C. In an exhaustive investigation he painstakingly recovered from the site of the crash the remains of the airscrew and was able to reconstruct enough of it to prove conclusively that it had not failed in flight and could not, therefore, have been the cause of the accident.

Examination of the wreckage of the airframe suggested to Thurston that the structure of the lower wing had failed in downward torsion. He slit open the fabric of the lower wing of *A4561* and found in that aircraft clear signs of incipient failure in the compression rib at both front and rear spars where the interplane strut attachment points were situated. At that time the compression ribs, although substantial enough in themselves, had no web element between their upper and lower contours. The original strut-to-spar joints were of such a nature that failure of the compression rib allowed the interplane strut to come out. This, of course, agreed with the eye-witness reports.

It is uncertain whether *A4561* was flown again. It was subjected to strength tests at Farnborough the official report on these (B.A.86) was dated April 1917. Thurston's recommendation that plywood

A4561 *after modification with overwing gravity tank, Vickers gun, side extensions of the windscreen, revised exhaust manifold and new centre section with enlarged trailing-edge cut-out.* (Photo: Imperial War Museum)

webs should be fitted to the compression ribs of the S.E.5 wings was adopted, and the structure of the aircraft gave no cause for anxiety thereafter: on the contrary, it came to enjoy a reputation for great structural strength.

The third prototype, *A4563*, was not sent for final inspection until 12th January 1917. Its original engine was No. 7019/W.D.10111, a geared 200 h.p. Hispano-Suiza driving a left-hand airscrew of greater diameter than those fitted to *A4561* and *A4562*. The radiator differed slightly from that of *A4561* but exhaust manifolds of the original pattern were retained. Although, as noted above, *A4563* inherited the centre section and port upper mainplane originally fitted to *A4561*, it was modified during assembly to have the external overwing gravity tank and its port upper wing was rebuilt. Having passed its inspection, *A4563* made its first flight on the same day, 12th January, with Goodden at the controls. The further development of *A4563* as the prototype S.E.5a is recounted in *Profile* No. 1.

Work on a production batch of twenty-four aircraft (*A4845-A4868*) had begun. A revised strut-to-spar joint was designed for them and the compression ribs were strengthened as suggested by Dr. Thurston. The first of the batch was submitted for final inspection on 1st March 1917, the last on the 30th of the same month.

The production S.E.5's differed from the prototypes principally in having a semi-enclosed cockpit. This may have been inspired by Sanday's criticism of *A4561*. The large transparent canopy extended forward over the breech of the single Vickers gun, which was offset to port and partly recessed into the main fuel tank. This cockpit cover may have been developed from the extended windscreen fitted to *A4561*. Yet another form of exhaust manifold appeared on the production aircraft. These were L-shaped, the outlet being at the front.

With the exceptions of *A4851*, *A4862* and *A4868*, all the S.E.5's of the first production batch had Aries-built Hispano-Suiza engines. *A4851's* engine (No. 5690/W.D.10108) had been made by Hispano-Suiza, Paris; *A4868* was the first S.E.5 to have a Wolseley-made engine (No. 627/2233/W.D.8202); and *A4862* was fitted with the same engine (No. 5213/W.D.10100) that had originally powered the first prototype *A4561*.

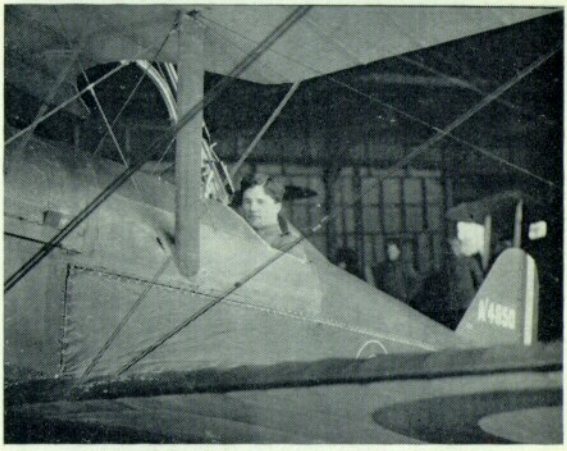
All the aircraft of the first production batch were built with the same wing-tip planform as the prototypes. It seems unlikely that there was any connexion between the crash of *A4562* and the later modification of the S.E.5 wing tips: a more likely explanation is that aileron control was inadequate with the original wings. Martlesham tested the first production aircraft, *A4845*, in March 1917, and the official report was severely critical of its aileron control:

> "Lateral control insufficient, especially poor at low speeds; hence the machine manoeuvred poorly, and was almost uncontrollable below 70 m.p.h. in gusts, causing a crash on getting off on 29/3/17. Suggested that aileron control be geared higher. The windscreen, unnecessarily large, hindered the pilot's landing view; this and the armoured seating are not now placed on standard machines. Time for complete turn of 360°, 12 seconds. Length of run to unstick, 95 yards; to pull up, engine stopped, 105 yards."

Modified mainplanes, their span reduced to 26 ft. 7·4 in., were introduced on the aircraft of the second

On the original production S.E.5 the pilot sat high, as seen here in this photograph of A8903 *being started up.*
(Photo: H. F. Cowley)

Captain Albert Ball in A4850 *at London Colney. The modifications to this aircraft allowed the pilot to sit lower down in the fuselage.* (Photo *above*: Imperial War Museum)



This photograph of Ball in A4850 *shows the shape of the enlarged cut-out in the modified centre section, the faired-over fuselage and modified petrol tank where the Vickers gun formerly was.*

Above and Right: A8904, *a typical S.E.5 of the second production batch, at Farnborough on 1st May 1917. The blunter wing ti and the radiator shutters can be seen. This aircraft was flown by Lt. Knaggs during the evening patrol of 7th May 1917, when Alb Ball was lost.* (Photos: Crown copyrigh

production batch, which started at *A8898*. On these wings the rake of the wing tips was reduced. In other respects the S.E.5's of the second batch resembled their twenty-four predecessors, having (as originally built) the large windscreen, overwing gravity tank and L-shaped exhausts. A refinement was the fitting of shutters over the upper half of the radiator.

A8898 was submitted for its final inspection at 6-55 p.m. on 18th April 1917; its "approved" note was received at 8-45 a.m. on 20th April. It was followed by *A8899-A8922*, *A8928-A8934*, *A8936-A8937* and *A8940*; as related in *Profile* No. 1 the other aircraft of the batch were completed with 200-h.p. Hispano-Suiza engines and were to all intents and purposes S.E.5a's. All the S.E.5's of the second batch except *A8914* had Wolseley-built Hispano-Suizas; *A8914* had No. 5218/W.D.10103, made by Hispano-Suiza, Paris. The last S.E.5, *A8940*, passed its final inspection on 17th June 1917.

Two aircraft of the second batch, *A8916* and *A8917*, were completed without armament. Not only were no guns fitted; there was no Constantinesco gear, nor was a Foster mounting installed. Royal Aircraft Factory records merely record that the aircraft were not fitted with armament and give no clue why this was so. Surviving photographs of *A8917* indicate clearly that it had within the centre-section leading edge the combined petrol and water gravity tank that was standardized for the S.E.5a. It retained the large windscreen on its cockpit, for a time at least, and had shutters on the upper half of its radiator. *A8916* was reported to be at Central Flying School in June 1917, in which month it was also tested at Martlesham Heath.

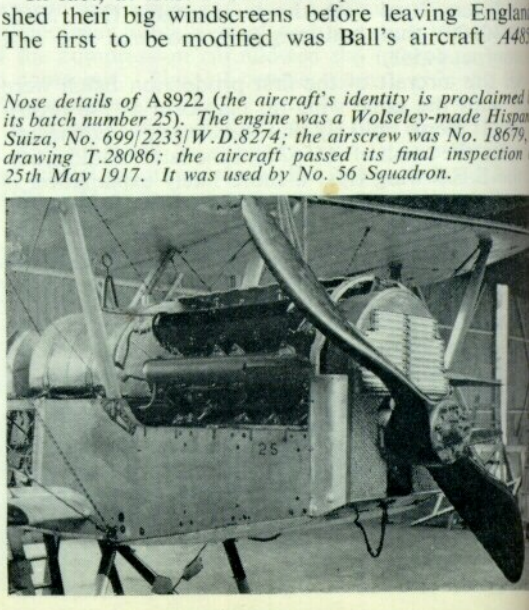
Most of the S.E.5's of the first production batch were sent to London Colney, where No. 56 Squadron, R.F.C., was approaching operational readiness. One of that famous unit's original pilots was Cecil Lewis who, in his book *Sagittarius Rising*, remembered:

"When I arrived only one S.E.5 had been delivered; but every day during the next fortnight before we left for France experienced pilots were rushed over to Farnborough to bring back others, till, on the 5th April, the establishment of twel was complete.

But the S.E.5, as delivered from Farnboroug was fitted with a cumbersome celluloid wind-scre covering the breech of the Vickers gun, with a aperture for the Aldis telescopic sight abov The 'greenhouse'—as we called it—greatly inte fered with forward visibility, and in the event of crash its sharp edges would have been dangerou to the pilot's face and arms. As soon as the Maj saw that the fighting efficiency of his pilots w going to be impaired, he moved heaven and ear to get these greenhouses removed. If the Factor did not see eye to eye with him about it, very w *he* would make the alterations. So for a wee after reaching France he put the whole squadro out of action while a sensible design of wind-scre was fitted to every machine".

In fact, at least two of the squadron's S.E.5's ha shed their big windscreens before leaving Englan The first to be modified was Ball's aircraft *A48*

Nose details of A8922 (*the aircraft's identity is proclaimed its batch number 25*). *The engine was a Wolseley-made Hispa Suiza, No. 699/2233/W.D.8274; the airscrew was No. 18679, drawing T.28086; the aircraft passed its final inspection 25th May 1917. It was used by No. 56 Squadron.*



which, fitted with engine No. 10046/W.D.10115, airscrew No. 16801/T.28051, Vickers gun No. 551 with Constantinesco C.C. gear No. 170, and Lewis gun No. 24873, had passed its final inspection at the Royal Aircraft Factory on 7th March 1917. It was again inspected on 14th March, having been fitted with a new port upper mainplane and aileron, and was delivered to No. 56 Squadron at London Colney on the following day.

The modifications that Ball wanted were numerous and were apparently in hand by 22nd March, on which date he wrote a remarkable letter that suggested he had, with very little flying time on the type and no operational experience of it, formed a strong dislike of the aircraft. He wrote:

"The S.E.5 has turned out a dud. Its speed is only about half Nieuport speed, and it is not so fast in getting up. It is a great shame, for everybody thinks they are so good and expects such a lot from them. Well, I am making the best of a bad job. If Austin will not buck up and finish a machine* for me, I shall have to go out on S.E.5's and do my best. I am getting one ready. I am taking one gun off, in order to take off weight. Also I am lowering the windscreen in order to take off resistance. A great many things I am taking off in the hopes that I shall get a little better control and speed. But it is a rotten machine, and if Austin's machine is not finished I am afraid things will not go very O.K."

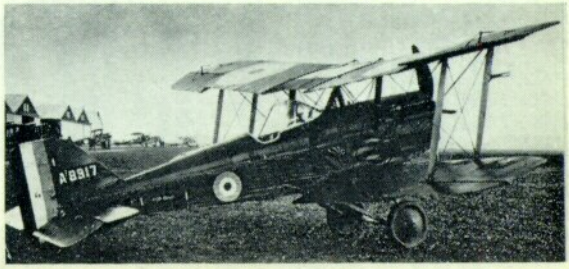
A small Avro-pattern windscreen of Triplex glass replaced the "greenhouse" on *A4850* and a new top decking of plywood was fitted ahead of the cockpit; a neat head fairing was added behind the cockpit. A completely new centre section was fitted: it had an enlarged trailing-edge cut-out and embodied an internal gravity tank in place of the original overwing tank. The seat and the tailplane controls were modified, and the standard undercarriage wheels with 700 × 100 mm. tyres were replaced by wheels with 700 × 75 mm. tyres.

The gun that was removed was the Vickers but, in spite of Ball's own reason for its removal, little weight could have been saved because he replaced it with a central Lewis gun firing forward and downward through the cockpit floor. Anything less practical and less typical of Ball's fighting methods could hardly be imagined. The removal of the Vickers gun permitted the use of a main fuel tank of slightly increased capacity, having no trough to accommodate the gun's barrel casing. Ball did not retain this bizarre armament for long. By 26th April 1917, a mere four days after No. 56 Squadron's first offensive patrol, the Vickers gun had been restored. Apparently the modified tank was retained, for the gun was mounted wholly externally above the fuselage.

The second of the S.E.5's to be modified at London Colney was *A4853*, Captain I. H. D. Henderson's aircraft. By the time *A4850* had been modified for

A8917, *second of the two S.E.5's completed without armament. The drain bowls for the tanks in the centre-section leading edge can be seen in the ¾-front view; the overflow pipes are visible in the other.*

(Upper photo: Imperial War Museum; lower, Real Photographs Co. Ltd.)



* *A reference to the Austin A.F.B.1, a single-seat fighter in the design of which Ball had acted in an advisory capacity.*

This S.E.5 of No. 60 Squadron was flown by Captain W. A. Bishop. Painted in the early style adopted briefly by No. 60 Squadron, it had a blue nose and blue diagonal stripe on the rear fuselage. Long exhaust pipes were fitted, and the aircraft evidently had the centre-section leading-edge gravity tank.

Ball, *A4853* had acquired a rather clumsy fabric-covered head fairing, and subsequently its large windscreen was replaced by one of the Avro Triplex type. The Vickers gun was retained, the revised top decking ahead of the cockpit having an aperture to give access to the cocking handle; a sliding panel was fitted over the ammunition belt box. An arch-shaped support of small-section steel tubing was provided for the lower end of the Foster mounting: on Ball's aircraft this had been secured by two bracing wires.

The Royal Aircraft Factory sent a draughtsman to London Colney to draw up the modifications made to *A4853*. This was done on 7th April 1917, the day the squadron flew to France, led by Lt. C. A. Lewis. As related above in the extract from Lewis's book *Sagittarius Rising*, Major Blomfield, No. 56's commanding officer, kept his squadron virtually grounded while Avro windscreens were fitted to the S.E.5's.

Ball led the squadron's first offensive patrol on 22nd April 1917, when six S.E.5's were ordered "to leave the ground at 9-30 a.m. and patrol for two and a half hours two miles this side of the line, as high as possible, the line Lievin-Nereuil." As the aircraft were new and secret, the order concluded with the note "On no account will an S.E.5 cross the lines under any circumstances".

On 26th April, Ball, flying *A4850*, shot down two enemy aircraft near Cambrai. The speed and fire power of his S.E.5 enabled him to escape from four other enemy aircraft, and this combat seemed to reconcile him to the S.E. Two days later he brought

To combat the Gothas then occasionally attacking London, No. 56 Squadron was brought back from France for home-defence duties on 21st June 1917, remaining at Bekesbourne until 5th July. Photographed during that period, Lt. K. Muspratt's aircraft, A8913, *can be seen to have had a modified cockpit with bulged sides. Perhaps the most significant feature of this S.E.5, at the time in question, is the absence of the overwing gravity tank.* (Photo: Imperial War Museum)

A4850 back badly damaged by anti-aircraft fire, wi all his elevator controls except the port top ca shot away.

On that same patrol Lt. G. J. C. Maxwell's S.E (*A4863*) was also struck by anti-aircraft fire. Wi engine damaged and elevator control all but go Maxwell crashed near Combles. Although t aircraft was wrecked, its sturdy structure saved hi from injury and he emerged unscathed.

Aircraft of the second production batch quick followed their predecessors to France. Ball fle *A8898* on 4th May 1917, and *A8902* was in his flig on that occasion. Ball shot down one enemy aircra and his combat report concluded with a hint that h opinion of the S.E.5's speed must have improved:

> "S.E.5 *A8898* turned and manoeuvred for position but both guns jammed, and S.E.5 *A8898* mad towards the lines, and easily outdistanced H.A owing to S.E.5 *A8898* being at least 10 m.p.h faster than any H.A. machine".

When Ball made his last flight on 7th May, th ten S.E.5's that set out with him from Vert Galand a 6 p.m. included *A8900*, *A8902* and *A8904*. A late combat report of No. 56 Squadron dated 23rd Ma mentions *A8903* and *A8909*.

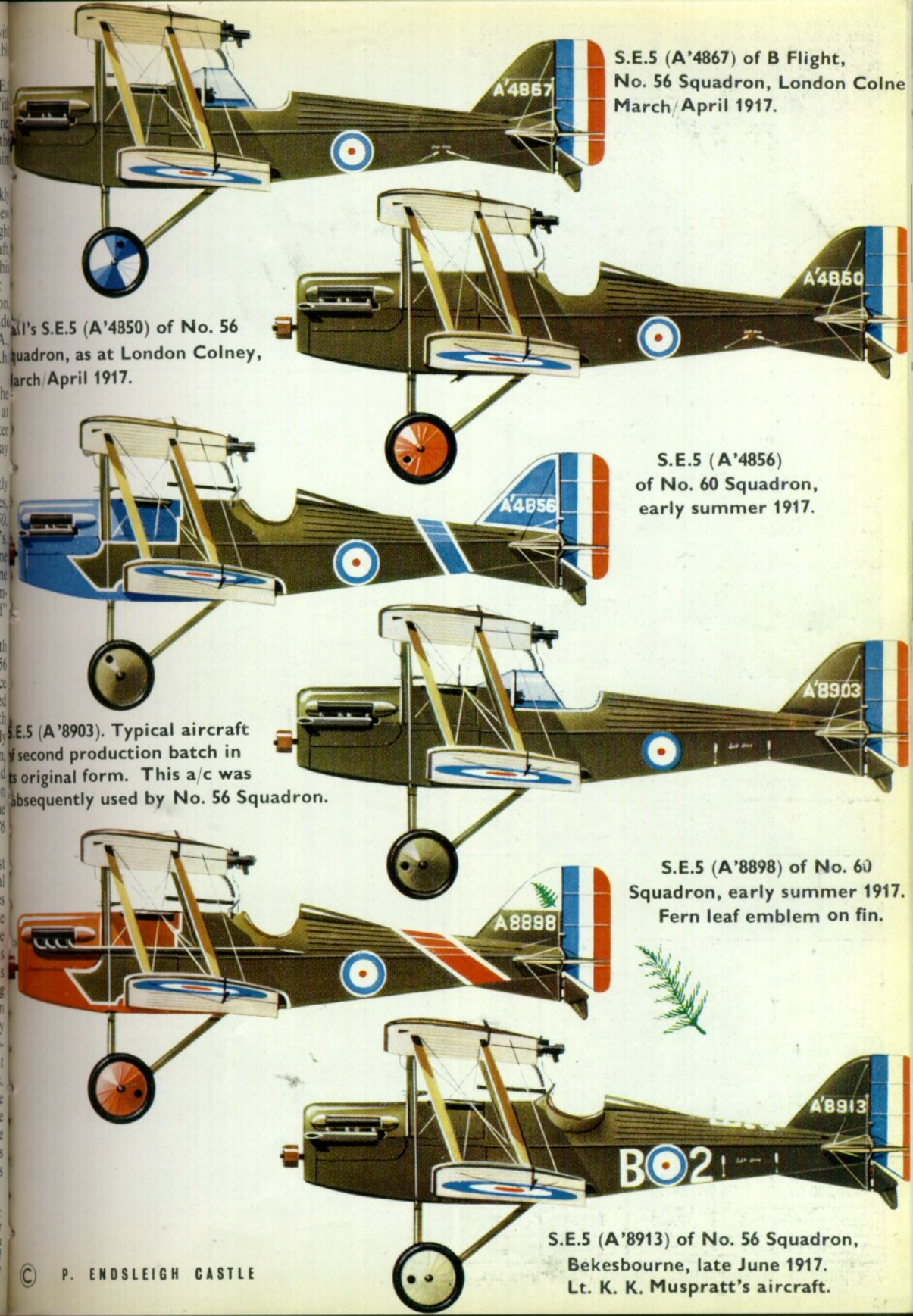
Modifications continued to be made. Shortl before his last flight Ball had long exhaust pipes similar to those of the Spad VII, fitted to *A485* Long exhaust pipes were also fitted to other S.E.5' With the removal of the large windscreens the outlin of the cockpit opening varied somewhat from on aircraft to another; in some cases pilots gave them selves more shoulder room by fitting "bulged fairings to the cockpit sides.

When No. 60 Squadron began to re-equip wit S.E.5's late in July 1917 it took over several of No. 5 Squadron's aircraft. These included *A8898*, onc flown by Ball, and *A4856*. The latter S.E.5 survive yet another transfer, for it was reported to be wit No. 24 Squadron on 12th December 1917.* The onl other unit known to have S.E.5's was No. 40 Squadron which inherited *A8913* from No. 56 Squadron an *A8932* from No. 60. It was with No. 60 Squadron that Lt. W. A. Bishop had his introduction to th S.E.5. He is known to have flown *A8930* and *A893* while with that unit.

The December dates quoted above are the late known times at which S.E.5's were still in operation use; but of course the possibility that 200-h.p. engin may have been installed in the aircraft by that la date cannot be discounted. It seems that few we used experimentally. At Farnborough *A4864* w tested on 27th June 1917 with narrow-chord aileron and a handle control for the tailplane adjustin mechanism. Some official documents conta references to aircraft described (and dimensional defined) as S.E.5's, fitted with 200-h.p. Hispan Suiza and Wolseley Viper engines; but more rece research has revealed that these were in fact S.E.5a'

Because the S.E.5 developed naturally into th S.E.5a it is virtually impossible to set a term to th S.E.5's career. When weighed on its own in th scales of the 1914-18 war, it had done much; in i S.E.5a form it was to be one of the aerial instrumen of victory.

**The date quoted casts doubt on the accuracy of this repo according to the history of No. 24 Squadron the unit did n receive its first S.E.5a until 24th December. This may me that* A4856 *(which was in any case an S.E.5) merely visit No. 24 Squadron as an advance sample of the unit's futu equipment.*



S.E.5 (A'4867) of B Flight, No. 56 Squadron, London Colne March/April 1917.

...l's S.E.5 (A'4850) of No. 56 ...quadron, as at London Colney, ...arch/April 1917.

S.E.5 (A'4856) of No. 60 Squadron, early summer 1917.

...E.5 (A'8903). Typical aircraft ...f second production batch in ...s original form. This a/c was ...bsequently used by No. 56 Squadron.

S.E.5 (A'8898) of No. 60 Squadron, early summer 1917. Fern leaf emblem on fin.

S.E.5 (A'8913) of No. 56 Squadron, Bekesbourne, late June 1917. Lt. K. K. Muspratt's aircraft.

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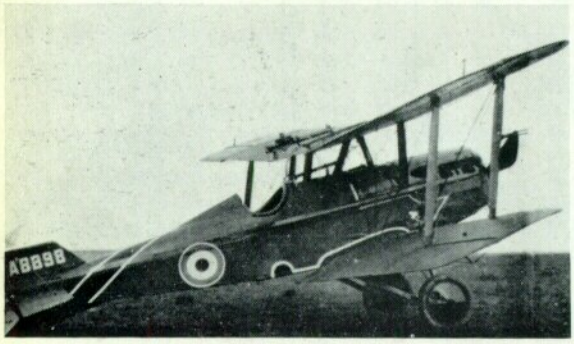
The second of No. 56 Squadron's S.E.5s to shed its large windscreen was A4853. *On this aircraft the head fairing was larger and clumsier than that of* A4850.
(Photo: Imperial War Museum)



The first S.E.5 of the second production batch, A8898, *after its transfer to No. 60 Sauadron. It had like Bishop's aircraft, acquired long exhaust pipes.*
(Photo: Imperial War Museum)

WEIGHTS AND PERFORMANCE

Aircraft	A4845 with original windscreen	A8911 with small windscreen	A8916
Engine	Aries Hispano-Suiza No. 10054/ W.D.10119	Wolseley Hispano-Suiza No. 691/2233/ W.D.8266	—
Weights (lb.):			
Empty	1,399	—	—
Military load	106	—	—
Pilot	180	—	—
Fuel and oil	245	—	—
Loaded	1,930	1,892	1,850
Max. speed (m.p.h.)			
At ground level	—	—	128
At 6,500 ft.	119	120	—
At 10,000 ft.	114	116	—
At 15,000 ft.	98	105	—
Climb to:	m. s.	m. s.	m. s.
5,000 ft.	— —	5 36	5 0
6,500 ft.	8 0	7 50	7 0
10,000 ft.	14 15	13 42	12 36
15,000 ft.	29 30	29 12	27 6
Service ceiling (ft.)	17,000	16,500	17,000
Endurance (hours)	2½	—	—

SPECIFICATION

Power: 150-h.p. Hispano-Suiza 8A.
Dimensions: Span originally 27 ft. 11 in., later 26 ft. 7·4 in.; length 20 ft. 11 in.; height 9 ft. 5 in.; chord 5 ft.; gap 4 ft. 7 in.; stagger 1 ft. 6 in.; dihedral 5 deg.; incidence 5 deg.; span of tail 10 ft. 11·9 in.; airscrew (T.28051) diameter 7 ft. 10 in.; wheel track 5 ft.; tyres, Palmer 700 × 100 mm.
Areas: Wings originally 249·8 sq. ft., later 244 sq. ft.; ailerons originally 8·5 sq. ft. each, later 8 sq. ft. each; tailplane 14·7 sq. ft.; elevators 15·8 sq. ft.; fins, upper 4·4 sq. ft., lower 1·7 sq. ft., total 6·1 sq. ft.; rudder 5·85 sq. ft.
Armament: One fixed 0·303-in. Vickers machine-gun with Constantinesco C.C. synchronizing mechanism; one 0·303-in. Lewis machine-gun on Foster mounting; Aldis and ring-and-bead sights.

Production

In addition to the prototypes 58 S.E.5's were completed* with the 150-h.p. Hispano-Suiza engine. All were built at the Royal Aircraft Factory, Farnborough, Hants.; their serial numbers were *A4561-A4563* (prototypes); *A4845-A4868*; of the batch *A8898-A8947* it is known that *A8898-A8922*, *A8928-A8934*, *A8936*, *A8937* and *A8940* were initially delivered with the 150-h.p. Hispano-Suiza.

Service use

Western Front: R.F.C. squadrons Nos. 24, 40, 56 and 60.
Examples of S.E.5's used by operational squadrons
No. 24 Sqn.—A4856 (ex-Nos. 60 and 56 Sqns.)† ,*A8900* (ex-No. 56 Sqn.).
No. 40 Sqn.—A8913 (ex-No. 56 Sqn.), *A8932* (ex No. 60 Sqn.; crashed 10th October 1917).
No. 56 Sqn.—A4848, *A4850* ('A' Flt., Capt. A Ball; the aircraft in which he was killed, 7th May 1917), *A4852*, *A4853* ('C' Flt., Lt. C. A. Lewis), *A4854*, *A4855* (flown by Ball on 2nd May 1917), *A4856* ('B' Flt., Lt. J. O. Leach; to No. 60 Sqn., probably July or August 1917; to No. 24 Sqn.† on 12th December 1917), *A4857*, *A4858*, *A4860* ('B' Flt., Capt. C. M. Crowe), *A4861* ('C' Flt. Lt. W. B. Melville), *A4862*, ('C' Flt., Lt. R. T. C. Hoidge), *A4863* ('A' Flt., Lt. G. J. C. Maxwell; wrecked 26th April 1917), *A4866*, *A4867* ('B' Flt., Lt. R. M. Chaworth-Musters), *A4868* ('B' Flt., Lt. A. P. F. Rhys Davids), *A8898* ('A' Flt., flown by Ball, 4th May 1917; later to No. 60 Sqn.), *A8899*, *A8900* ('C' Flt., Capt. H. Meintjes, Capt. G. H. Bowman; later to No. 24 Sqn.), *A8902* ('A' Flt., Lt. G. J. C. Maxwell), *A8903*, *A8904* ('A' Flt., Lt. K. J. Knaggs), *A8905*, *A8906*, *A8907*, *A8909* (Capt. P. B. Prothero), *A8910*, *A8913* (Lt. K. Muspratt; later to No. 40 Sqn.), *A8919*, *A8922*, *A8928*, *A8934* (Lt. R. A. Maybery; later to No. 60 Sqn.), *A8937*.
No. 60 Sqn.—A4856 (ex-No. 56 Sqn., later to No. 24 Sqn.), *A8898* (ex-No. 56 Sqn.), *A8901*, *A8918*, *A8930* (Lt. W. A. Bishop), *A8932* (later to No. 40 Sqn.), *A8933*, *A8934* (ex-No. 56 Sqn.), *A8936* (Lt. W. A. Bishop).
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* *Although inspected on 5th/6th March 1917 with engine No. 10066, A4849 was delivered early in April to the R.F.C. School of Technical Training, Reading, without engine, radiator, airscrew, engine cowling, Constantinesco gear or armament. So far as is known it was never flown.*

† *But see footnote on* A4856 *on page 10.*

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